

Open Defecation and the Human Waste Crisis in India

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Submitted to the graduate degree program in Global and International Studies and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Arts.

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Date Defended: April 14th, 2014

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Abstract

This thesis analyzes the human waste crisis in India. The lack of sanitation facilities as well as open defecation seriously impacts India's ability to achieve its sanitation goals by 2015. More importantly if the World Health Organization is to meet its Millennium Development Target of improved sanitation for all by 2015, it is critical that India must meet its goals. Although certainly not by 2015, this paper will seek to explain the likelihood and the means by which India can attain this goal by 2022.

Acknowledgements

I would like to thank my family for their patience and understanding, my advisor Dr. Darlene Budd for her guidance and my supervisor Herbert Tuttle for his support.

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Chapter 1 - Introduction

India's human waste problem is acute and getting worse every year. According to WHO statistics (2012), more than 600 million people having no access to a toilet defecate in the open and data provided by India's census 2011 indicates a shockingly high 49.8 percent of India's 24.66 crore households defecate in the open. Only 46.9 percent of the households have access to a latrine and 3.2 percent use some sort of public facility. The situation in the rural areas is worse. (www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf)

This paper will seek to explain the likelihood and the means by which India can attain its basic sanitation goal by 2022. Of the urban population about 80 percent now have access to a toilet, however, only about a third of the household toilets are connected to a sewage pipeline and shockingly not many of these sewage pipe lines are actually connected to a treatment plant thereby dumping sewage in the open.

According to Sunita Narain, the Director General of the Center of Science and Environment, India's dismal sanitation situation is the reason for the country's extremely high rate of water borne diseases. In her book on India's sanitation problems, "Excreta Matters: How India is Soaking up Water, Polluting Rivers and Drowning in its Own Waste", she contends that a new non-western approach and a new design is the only way to get a handle on this problem. The western approach that requires huge quantities of water as well as energy is neither tenable nor practical. She contends that with 600 million Indians defecating in the open, no matter how many toilets are built, India will continue to drown in its own human waste and the challenge of managing it will continue to grow.

With the rapid increase in population, water is becoming a scarce resource. To manage this scarce resource especially as it relates to human waste, will be a challenge for the government of India. Hence, the call for a different approach to human waste management.

The health impact of the sanitation crisis in India is severe. According to the WHO/UNICEF Sanitation Assessment Report of 2004, only 33 percent of the population had sanitation facility available and in the rural areas it was 59 percent. Although there has been a great deal of progress since then, the situation is still quite dismal. One of the main reasons is related to human waste. Due to lack of facilities, a majority of the people defecate in the open. This contaminates water supply and defiles ecology, thereby resulting in the spread of devastating water related diseases. Studies carried out in India and abroad indicated that human waste is the main cause of many diseases such as cholera, dysentery, typhoid, infectious hepatitis, hookworm, diarrhea etc. Human excreta is the cause of over 50 infections transferred from a sick person to a healthy one through direct or indirect contact with it. The appropriate disposal of human waste should be the main objective of improving sanitation in a country such as India where the population is exploding.

The health crisis that is facing India disproportionately affects children. According to the Food Policy Research Institute, India has the highest rate of childhood malnutrition rates in the world – almost 44 percent of children under age 5 are underweight. “Malnourished children are most susceptible to diarrheal disease and with more diarrheal disease they become more malnourished.” according to Jamie Bartram, head of the World Health Organization’s water, sanitation and hygiene health group. If basis water and sanitation problems are fixed,

childhood mortality could be reduced by almost a third.

(http://www.unicef.org/india/overview_3696.htm)

India's sanitation crisis is a result of years of neglect, ignorance, lack of education and apathy on the part of the government to address the problem. It is also the nature of the subject that limits its discussion. Only recently has the media been willing to talk about human waste management or the lack of it in India. The taboos surrounding this subject and the unwillingness to talk about topics such as defecation and human waste has resulted in the situation being as dire as it is today. According to Sarah Jewitt, ".....deeply embedded taboos surrounding human feces have often (but not always and not everywhere) created barriers to the development of more effective and /or sustainable excreta management systems" (Jewitt, 2013)

The government of India has been very slow to address the sanitation crisis. This is not a problem that surfaced overnight. It is because of years of neglect on the part of the government and policy makers to address the crises that the situation is what it is today.

It is ironical that in circa 2600 BC when toilets and sewers were invented in different parts of the world, Mohenjo-Dara (in India) had some of the most advanced sanitation with toilets and sewers almost replicating modern day toilets and according to Sir Mortimer Wheeler, the Director General of archeology in India, "The high quality of the sanitary arrangements could well be envied in many parts of the world today" (Penna, 2010).

Chapter 2 - A Historical Analysis of the Problem

In March 1977, the United Nations, recognizing water as a human right declared: “All peoples, whatever their stage of development and social and economic conditions, have the right to have access to drinking water in quality and quantity to their basic needs”. It was only in January 1992 at an international conference in Dublin that the UN included sanitation as a right of all human beings. Principle 4 of this conference emphasized that “.....it is vital to recognize first the basic rights of all human beings to have access to clean water and sanitation at an affordable price” (UN-water Decade Programme on Advocacy and Communication (UNW-DPAC)).

There were several conferences that followed that emphasized clean water and adequate sanitation as a right for all human beings. However, it was only in September 2010 that the UN Human Rights Council affirmed the right to water and sanitation as being a part of the international law and affirmed these laws as legally binding upon states.

In April 2011 the UN Human Rights Council Resolution decided unequivocally “to extend the mandate of the current mandate holder as a special reporter on the human right to safe drinking water and sanitation for a period of three years” and “to promote the full realization of the human right to safe drinking water and by inter alia, continuing to give particular emphasis to practical solutions with regard to its implementation, in particular in the context of country missions and following the criteria, availability, quality, physical accessibility, affordability and acceptability” (UN-water Decade Programme on Advocacy and Communication (UNW-DPAC)).

In accordance with these UN resolutions and mandates, the World Health Organization (WHO) being the specialized agency of the UN, promoted “the attainment by all peoples of the highest possible level of health” (WHO Looking back: Looking ahead). In addition to the eradication of diseases such as small pox, leprosy, cholera, malaria, polio and tuberculosis, the WHO has also concentrated its efforts on global problems that impact health and sanitation as foremost among them.

The WHO publication: “Five Decades of Challenges and Achievements in Environmental Sanitation and Health. Looking Back: Looking Ahead” emphasized sanitation as the foundation for a healthy population: “WHO has always maintained that sanitation is literally the foundation on which sound health structure must be built. Over the last 50 years WHO has generated, evaluated and shared new knowledge on safe disposal of excreta, sewage and community waste and been at the forefront of exploring the linkages between environmental pollution and change, and peoples’ health and livelihood, especially poor people living in countries where basic infrastructure is lacking, are seriously affected by environmental degradation. In addition, the ongoing and deteriorating situation of sewage causing environmental pollution needs urgent and serious attention” (WHO Looking back: Looking ahead).

Millennium Development Goal 7: Target C

To this end the WHO adopted the Millennium Development Goals (MDG’s) in September 2000 which called for reducing poverty as well as improving the health of the

world's poor and improving water and sanitation as crucial to meeting this goal. It is interesting to note that although huge strides have been made towards the attainment of this goal with respect to accessing safe water all over the world, sanitation has lagged far behind.

According to this WHO report, there has been little improvement in sanitation since 1996 when the WHO/UNICEF Joint Monitoring Report concluded that "Analysis of the global sanitation figure leaves the unavoidable impression that sanitation has been almost totally neglected in the four years from 1990-1994" (WHO Looking back: Looking ahead). In comparison to safe water provisions, for many governments, investments in sanitation were not a priority. India was one of the countries where sanitation was totally ignored. Today it is because of this neglect that sanitation provisions cannot keep up with the exploding populations of countries such as India and China. Although 747 million people found access to improved sanitation, it has certainly not kept pace with the huge jump in population during the decade 1990-2000. Almost 2.4 billion people were left without sanitation: a vast majority of these people were in Asia and Africa.

To gain a historical perspective on this very important issue, it is prudent to look at where we have been and where we can hope to be. According to WHO, the sanitary revolution started in London in 1852 with the Metropolitan Water Act which required the water supply of the town to be filtered. An association between polluted water and disease was established with the breakout of the 1882 Hamburg Cholera Epidemic. Following this, the examination of London's water supply for routine bacteria check was established in 1885 which in turn led to the chlorination of water in 1908. The Pan American Sanitary Bureau was established in 1902

which emphasized improvements in sanitation and its disposal. Finally in 1936 the Health Organization of the League of Nations published reports on water supply, the treatment of sewage and the collection as well as treatment of domestic refuse which led to the establishment of the Committee on Environmental Sanitation by the first World Health Assembly in 1948. The chart below illustrates the water supply and sanitation milestone of the UN.



(Source: WHO Looking back: Looking ahead. Five decades of challenges and achievements in environmental sanitation." 2003. Report.

http://www.who.int/water_sanitation_health/hygiene/envsan/lookingback/en/)

India and the Millennium Development Goals

In 2000 the Millennium Development Goals (MDG) were established. Target 7 of the goals, called for reducing by half, the proportion of people who do not have access to safe drinking water and basic sanitation by the year 2015. Throughout the world, countries have

fallen far short of this target. In other words, although great strides have been made with respect to safe drinking water, sanitation has fallen way behind. According to WHO reports, in 2008 almost 2.6 billion people still had no access to a hygienic toilet or latrine and almost 1.1 billion people were defecating in the open. This has resulted in very high levels of contamination, exposure to diseases and worm infestations, such as hookworm and ascariasis as well as hepatitis, salmonellosis and shigellosis infections. Of the people who defecate in the open, 949 million live in rural areas. However, there has been a sharp increase in the number of people living in urban areas that do not have access to improved sanitation and are therefore being forced to practice open defecation.

Based on WHO data up to and including 2010, the statistics on India are staggering. India has 626 million people who defecate in the open. This number accounts for 90 percent of the 692 million people in South Asia who do so. Based on world statistics, it accounts for 57 percent of the 1.1 billion people who practice open defecation. This is a huge number.

Countries Practicing Open Defecation

Countries that account for almost three-quarters of the people who practice open defecation:

- India (626 million)
- Indonesia (63 million)
- Pakistan (40 million)
- Ethiopia (38 million)
- Nigeria (34 million)
- Sudan (19 million)
- Nepal (15 million)
- China (14 million)
- Niger (12 million)
- Burkina Faso (9.7 million)
- Mozambique (9.5 million)
- Cambodia (8.6 million).

Note: All the information in this report is based on data available up to and including 2010.

(Source: WHO Looking back: Looking ahead. Five decades of challenges and achievements in environmental sanitation." 2003. Report.

http://www.who.int/water_sanitation_health/hygiene/envsan/lookingback/en/)

Based on these statistics it is clear that the situation in India is dismal and getting worse with a growing population.

In order for the WHO to meet its MDG basic sanitation goal by 2015, it is critical that a country like India with such a large population meet this target. Without substantial sanitation improvements in India, meeting the target goal of improving basic sanitation by 2015 seems elusive. The chart below gives the percentage of the Indian population who has access to improved sanitation in rural and urban areas. As the chart suggests, although access to

improved sanitation has doubled in the last 20 years, a majority of India's population must resort to open defecation.

Year	Improved			No sanitation		
	Urban	Rural	Total	Urban	Rural	Total
1990	51	7	18	28	91	75
1995	53	10	21	25	86	70
2000	55	14	25	22	79	63
2005	56	19	30	18	73	57
2010	58	23	34	14	67	51

Population (in percent) of India with access to improved sources of sanitation, and no sanitation. Source:

WHO/UNICEF (2012b). The proportions of the population with access to improved sources and no sanitation do not add up to 100 percent. The remaining population has access to unimproved sources.

(Source: Vedachalam, Sridhar. "Water supply and sanitation in India: Meeting targets and beyond." Global Water Forum, October 2012.

<<http://www.globalwaterforum.org/2012/09/23/water-supply-and-sanitation-in-india-meeting-targets-and-beyond/>>.)

Five Indian states in particular contribute greatly to the problem: Chhattisgarh, Madhya Pradesh, Bihar, Jharkhand and Orissa. These are largely rural areas where less than 30 % of the population has access to any sanitation source at all. Hence, it is almost certain that India will not be able to meet the Target 7C goal of the MDG by 2015.

To complicate the issue and make matters worse, access to sanitation in India is influenced by caste as well. The lower caste or untouchables historically earned their livelihood by collecting and disposing of human waste. As a result, the states with the highest rate of improved sanitation are states with more egalitarian societies which are the northeastern states as well as the southern state of Kerala where Hinduism (and hence the caste system) is not the major religion. In particular Kerala in south India has a long history of social reforms and anti-caste movements.

Socio economic factors affect access to sanitation as well. Hence the poor are more disproportionately affected. According to data, the poor who are roughly 40 % of the population have not benefited from improved sanitation in India and hence are 47 percent more likely than the rich to practice open defecation. It is simply a matter of accessibility. They do not have access to sanitation facilities. (Vedachalam, 2012)

Sulabh International

In India, bucket latrines were in common use for excreta disposal throughout the 1950's, 1960's and the 1970's. Even today in many rural parts of India it is still in practice. Scavengers who in India's caste system were considered the "lower caste" or "untouchables" did the work of collecting the human waste or "night soil" by carrying the waste in baskets or buckets as head loads and disposing it in dumping sites. This degrading and dehumanizing practice was in existence in India because there was no better system of disposing human waste. To end this degrading practice, Mahatma Gandhi insisted on an end to this waste

disposal practice and to this end the government of India allocated substantial funds to construct sanitary latrines. Sadly, this did not end the practice of scavenging. To this day, although illegal, it is still in practice in some rural parts of India. (Sulabh International Social Service Organization)

The work of Dr. Bindeshwar Pathak has providing millions of Indians with an alternative to open defecation and scavenging. He believed that although the government was allocating the money towards the construction of latrines, a latrine suitable to the conditions in India was the key. Hence, in 1970 he founded his organization “Sulabh International” to research and design what would be compatible to the socio-economic conditions in India. The result was the two-pit pour flush design which was called the “Sulabh Shauchalaya”. This fulfilled all the conditions for human waste disposal that was safe and hygienic. In addition he also introduced the use of the digested excreta as compost and the generation of biogas. This resulted in the rehabilitation of thousands of scavengers by providing training for alternate means of employment.

Dr. Pathak’s innovative research and implementation of the two pit pour flush latrine was carried out in consultation with WHO experts. “In 1972, WHO supported a national consultation meeting, organized by the government of India in Patna, to introduce State Chief Public Health Engineers to this integrated approach and to consider the feasibility of introducing it with appropriate modifications to suit local socio-economic situations country wide” (WHO Looking back: Looking ahead).

As a result of the success of the two-pit latrine design, by 1978 Sulabh International had constructed about 10,000 latrines just in the state of Bihar. Based on the approval by the WHO, the government of India approved the installation of these low-cost latrines in seven states and 110 towns.

Lack of sanitation in India involves not only the waste disposal systems but also the water supply as well as the sewer networks. Open defecation is a huge problem in India and has resulted in the deaths of millions of children from 50 different diseases.

Sulabh International's low-cost, affordable and cultural appropriate two-pit pour flush toilets are now being used in more than one million households, as well as in hundreds of community toilets. This innovative design is also being used by millions of people worldwide predominantly in Africa and Asia. It is approved by the World Bank, UNESCO and other international agencies. The reason for its popularity is the appropriateness and simplicity of the design. In a country like India where the establishment of sewage treatment plants is a major undertaking (due to the cost involved), Sulabh toilets are the perfect answer since it does not require treatment by sewage plants and does not need connection to sewage networks. It functions independently of the city's sewage system. Since 60% of the sewage in India is not treated and raw sewage is discharged into the rivers, in the long run, adopting the Sulabh toilets will prevent the rivers and other water bodies from becoming polluted with human waste.

Rapid increase in population has resulted in a growing urbanization at an unprecedented scale. This has further exacerbated the sanitation situation, which was very

limited to begin with in urban areas. Starting with the small town of Patna in the state of Bihar, Sulabh Shauchalayas or toilets spread very quickly all over India.

Despite the importance and emphasis on educating the public, even today, mostly in rural areas houses are still being constructed without toilets. This is related to the Hindu cultural attitudes of keeping filth away from the house. Moreover, government officials do not put enough emphasis on sanitation and the construction of toilets in rural areas. There is no law that makes it mandatory.

The innovative design of the Sulabh toilet gave a new push to the sanitation movement in India starting in 1990 with the construction of the first Sulabh toilet. This was a low cost, pour flush water seal toilet with two pits which did not require the manual disposal of human excreta, hence eliminating the bucket latrine disposal system and the manual handling of human waste. It was simple and low cost and required only one-fifth of the water of the conventional toilet: using only 2 liters per flush as compared to about 10 liters used in conventional toilets. The conservation of water is so critical since it is such a scarce commodity not only in India but in other parts of Asia and Africa as well.

The Sulabh technology made available several designs to suit the income level and the local resources available as well as the geographical terrain of the location. Being economical it is preferred by the common man. In addition, the other advantages are that it is free of odors and can be constructed of local materials. Moreover, it is easy to construct and can be connected to sewers if and when they are constructed in the area. The two-pit system works

for several years and does not need emptying by scavengers. In addition, the system also yields high quality manure.

Due to their popularity, Sulabh toilets have spread rapidly, in turn eliminating the humiliating work of the scavengers and liberated them from this inhuman practice. Many towns and villages where the Sulabh technology was introduced have become scavenger free since dry latrines have become obsolete. Community toilets were built for very poor rural communities that could not afford a toilet in their home. Sulabh introduced the public toilet system that operates on a pay for use basis. A nominal fee is charged which then helps with the upkeep and maintenance of the facility. These community toilets have most importantly provided dignity and safety to millions in India who previously had no option but to defecate in the open.

Attitudes towards Human Excreta

It is interesting to note here how different cultures regard human excreta. Some tolerate it to a certain extent while for others the sooner it is out of sight, the better. Some cultures regard it as extremely abhorrent and disgusting while others have tolerated the handling of human waste. Even now in some parts of urban China, night soil workers cart away human waste in “honey carts” and in Vietnam there has been a long tradition of fertilizing rice fields with fresh human feces. (Jewitt, 2013)

In India on the other hand, many Hindus consider the handling of human waste as taboo and have hence designated it as the work of the “untouchables”. It is interesting to note here how the indifference to public dirt and filth is contradicted with private cleanliness, emphasis being placed on the purity of the body. Therefore, “once waste is pushed out of the physical boundary of the house, it then belongs to the “public” domain and therefore everybody is entitled to dump rubbish or even defecate in it” (Jewitt, 2013). Similarly it is paradoxical how Indians are very particular about the removal of filth from their homes but indifferent to what happens to it afterwards.

Chapter 3 - Ecological and Innovative Approaches to Human Waste

Disposal

With the Taj Mahal in plain view, Meera Devi, a resident of the village of Kachpura rises before dawn to walk a half mile to defecate in a vegetable patch outside her village. She avoids leering men and spots that were previously soiled by her neighbors as well as farmers with sticks in their hand to find a spot to relieve herself. “As a woman I would have to check where the males were going to the toilet and then go in a different direction”, she said. “We used to avoid daytimes but if we were really pressured we would have to go any time of the day even if it was raining. During the harvest season, people would have sticks in the field. If somebody had to go, people would beat them up or chase them” (Bloomberg, 2009).

The Yamuna River that runs alongside the Taj Mahal is heavily polluted with human feces and so is India’s holiest river, the Ganges. Seventy five percent of India’s surface water is polluted, being contaminated by human and agricultural waste as well as industrial run offs. According to the Ministry of Urban Development (2009), everyone is at a risk of consuming human feces if they haven’t already done so.

Fortunately, Meera Devi’s story has a happy ending – with a 7,000 rupee interest free loan from the U.S. Agency for International Development, she was able to install her neighborhood’s first toilet. Just like in Kachpura, Meera Devi’s village, connection to a sewage system in Agra (city where the Taj Mahal is located) is rare. Less than a fifth of the city is connected to the sewage system since the city only has the capacity to treat 60% of its sewage. (Bloomberg, 2009)

Western Style Toilet Not the Answer

According to Santha Sheela Nair (2009), India's secretary of drinking water supply, the western style toilets are not the answer to India's human waste crisis. Due to the lack of water in much of India, the western style toilets are completely impractical. Moreover, the resources needed to construct and operate sewage treatment plants make the western toilet inappropriate for India. Instead alternatives must be found. Alternatives that are cheaper, environmentally friendly and more efficient and that take the scarcity of water and monetary resources into consideration.

India has struggled for years to come up with the best way to clean up its mess, according to Ajith Kumar, an operation analyst with the World Bank's Water and Sanitation Program in New Delhi. "The predominant experience has been that none of this has worked." (Bloomberg, 2009). A case in point is the southwestern state of Andhra Pradesh where the state government helped build household latrines for about 2.94 million households. The residents received cash subsidies from the government as well as coupons for 100 Kilograms (220 pounds) of rice. However, half the toilets were either not being used or were being used for other purposes. Similarly, in the western state of Maharashtra, where 6 million toilets were built from 1997 to 2000, only 47 percent were in use. According to Payden (who goes only by one name), WHO's New Delhi based regional advisor on water, sanitation and health, "The toilets were much stronger and safer, so they used them for storing grain instead" (Bloomberg, 2009).

With the "Nirmal Gram Puraskar" or "Clean Village Prize", India is trying a new approach to get people to end the practice of open defecation and use toilets instead. This is the reward

of 50 million rupees that is given to local governments that end open defecation. In a “Nirmal Gram” or clean village all households must have access to sanitary toilets and there must be an awareness and importance of maintaining community and personal hygiene. (India Sanitation Portal). To receive the award certain guidelines must be followed. In 2005, thirty eight villages qualified. In 2006, 760 villages and 9 municipalities received the reward. Two years later in 2008 more than 12,000 Nirmal Gram Puraskar awards were given out. However, some doubts have been cast on these numbers and misrepresentation of government officials in order to boost success rates. At the same time village authorities have in their eagerness to get the financial rewards, misrepresented facts as well. (Bloomberg, 2009)

It would not be an exaggeration to say that India is facing a sanitation emergency and women and children are the hardest hit. A study on women’s health at the SNDT University in Mumbai found that in the rural areas in the state of Tamil Nadu there were very few toilets. In this study, out of 1,017 women who were interviewed, only 5 had toilets at home and the others went into the fields or other spaces for open defecation. They did so at extreme risks to their health and safety. Furthermore, in trying to restrain themselves from having to defecate in the open, they drastically reduce their intake of water and food thereby resulting in urinary tract infections and gastroenteritis which they suffer from almost all the time. (Krishnakumar, 2003)

According to Sunita Narain, Director of the Center for Science and Environment in New Delhi, “The flush toilet and the sewage system- which I always believed was the epitome of personal hygiene and environmental cleanliness were a part of the environmental problem and not the solution” (Narayan, 2003: 11).

Sanitation and the Scarcity of Water

With the growing scarcity of water all over the world, there is also an intense competition for the use of water from different sectors namely agriculture, daily consumption and sanitation. There is a huge difference in its use by rural and urban population. While the consumption of water in urban areas is huge, there are water shortages in most urban cities. Rationing of water is prevalent in most cities – households get water for only a few hours a day and sometime even a few hours a week where there is acute shortage.

It is in this environment argues Sunita Narain that the flush toilet is not only impractical but also “ecologically mindless” (Narain, 2003: 12). In developing countries like India as well as globally it is projected that water crisis will be worse than the oil crisis, simply because to live one can do without oil but not without water. To make matters worse, there are various industries that compete for water namely agriculture and industries that are water intensive like the excavation for gas through “fracking”, recreational activities and most importantly, human consumption.

Water scarcity in India is not something new however, in recent years the crisis has intensified. The consumption of water in urban cities is many times that of rural areas. What makes it worse is that urban settlements are getting bigger and bigger and more congested every day. Hence, the shortage of water is now a norm in most parts of India. Furthermore, in rural areas the situation is further exacerbated due to the fact that traditional local water resources have been slowly lost over time.

However, Narain in her opening session of the “Second Annual International Symposium” noted: “But it is important to realize that water shortage is not about the lack of

water per se” (Narain, 2003: 12). There are places in India like Cherrapunji which is known as the wettest place on earth. Here ironically there is always an acute shortage of water because the city lacks the means to store the rain water. On the other hand, we have the example of the desert city of Jaisalmer where it rains very infrequently. The city however, according to Narain “...has been on major caravan routes for trade and has no recorded history of being evacuated for lack of water” (Narain, 2003: 12). Hence water shortage and scarcity is also very much about the conservation and optimal use of this precious commodity.

It is against this backdrop of water scarcity that the sewage system in India no longer makes sense. The United Nation’s Millennium Development Goals (MDH) cannot be met if India relies on the sewage system to resolve the sanitation crisis. As Narain puts it:

“Consider how first a large amount of clean water is used to carry away a small quantity of human excreta. In India, flushes are designed to be particularly water wasteful. So with each flush over 10 litres of clean water go down the drain. We build huge dams, irrigation systems and what not to bring water to urban areas. Then this water which is flushed down the toilet goes into an equally expensive sewage system, all to end up polluting more water – invariably rivers and ponds. Most of our rivers are dead today because of the domestic sewage load from cities. We have turned our surface water systems into open sewage drains. This is hydrocide – deliberate murder of our water bodies.” (Narain, 2003: 12)

In the bigger cities only a fraction of the sewage that is collected is treated in sewage plants. The remainder of the human waste is dumped untreated into rivers and ponds and other water bodies. In large cities only 26 percent of the human waste is treated. In smaller cities there is no collection at all. Furthermore, the building of sewage treatment plants are so cost prohibitive that there is no way for the government to keep up with the amount of sewage generated. As the author puts it, “We chase targets hopelessly and remain miles behind the volume of sewage being generated. In a rapidly urbanizing situation, the city would soon

outgrow the sewage treatment capacity created at a high cost. Further investments will be needed all over again.” (Narain, 2003: 13) Furthermore, the sewage plants that do exist do not perform to their full capacity since the city’s sewage drains remain clogged and silted. Sewage from these choked lines is diverted to functioning lines with the result that these sewage treatment plants get overloaded. Therefore, they are either underutilized or overloaded. Even if the Indian government has the willingness to treat all its sewage, it does not have the means to do so since they are so cost prohibitive. Additionally, the most urban municipalities do not have the financial resources to bear the expensive operating costs. It is quite clear then that water borne human waste disposal in a country like India with an exploding population is not feasible.

Hence an alternative means of sewage disposal is necessary – one that is cost effective and at the same time is not water intensive. What works in the west can no longer be an option for developing economies like India. The traditional flush toilet is neither practical nor suitable for a country like India where the cost of sewage treatment is so prohibitive. Both in India and in other developing countries there are individuals and organizations that are involved in research into other means of human waste disposal which uses very little or no water at all and where the byproducts (water and solid waste) are recycled.

Ecological and Innovative Solution

The concept of ecological sanitation as a means of human excreta disposal is becoming quite popular. Also referred to as composting, there are several advantages to it. The human waste turns into compost which is then used as fertilizer for the soil.

In India and other developing countries, simpler ecological sanitation (ecosan) systems are being experimented with. These not only provide sanitation but also are a means of income generation through the sale of compost as fertilizer to enrich soil. It is therefore, strongly supported by the United Nations Development Programme (UNDP) due to the fact that in addition to providing sanitation it also is a means of reducing poverty as well as arresting the fertility decline of the soil which are the salient features of the UNDP Millennium Development Goals.

Compost

Various kinds of composting toilets have been designed and developed. One prominent example of the design and use of these toilets is in Sweden where they have become quite popular in holiday cottages as well as in public restrooms on highways etc. Sarah Jewitt (Jewitt, 2011) in her article gives the example of Sweden's Tanum municipality where the local government encourages the use of composting toilets with "urine diversion" in new homes that are being built. The urine is diverted into tanks which is collected by the municipality and then is sprayed onto crops. "This initiative" writes Jewitt, "forms part of an effort by Tanum's local government to meet the Swedish parliament's environmental quality objectives which includes

zero eutrophication and flourishing lakes, watercourses and coastal areas. This because of the nitrogen content in urea, it is an excellent fertilizer” (Jewitt, 2011: 764). In India where the human waste disposal is an ever growing problem, the ecosan system is an excellent alternative since it disposes human waste in an environmentally appropriate way and most importantly does not require water for flushing.

Another very important advantage of the ecosan system is that it is much safer as compared to pit latrines that are further away from homes. Furthermore, because of the absence of water, women do not have to travel distances to collect water.

The drawback to the adoption of ecosan systems in rural areas in India is the taboo associated with the handling of human waste. The system does not make human waste disappear from sight. Rather it must be handled by individuals using the toilet. Unlike the conventional toilet where the feces is flushed away, human intervention is needed to aid in composting and then removing the composted feces for fertilizer etc. Although in progressive societies like Sweden where it is widely accepted, in India it has taken a great deal of persuasion and education for the people in rural areas to adopt. However, the use of the composting toilet is slowly catching on.

In India as well as in other parts of the world, human waste is also being used as energy for lighting as well as for cooking. Sarah Jewitt in her article cites the example of the old city of Sena in Yemen where “dried human feces have been used as a heating fuel for hundreds of years.” (Jewitt, 2011: 765). Because of the advantages associated with the use of biogas for cooking and electricity, Nepal through its national biogas program has constructed over

200,000 plants between 1992 and 2009 and in India biogas plants are becoming more and more popular especially in rural areas.

Biogas

In the 1980's the Indian government launched the "Gobergas" project. Every farmer who owned less than 5 acres of land and a few cows was given a biogas generator. Typically the generator requires 25 kilograms of cow dung and produces enough gas to last for about 3 hours. However, with the "green revolution" which started in the 1960's more and more farmers started relying heavily on imported high yielding seeds, chemical fertilizers and intensive irrigation. Using cow dung as fertilizer gradually became obsolete. Chemical fertilizer had replaced it. It is only recently that people have come to the realization that chemical fertilizers are not only very detrimental to the environment, but also ultimately not sustainable. Cow dung not only served as an excellent fertilizer but also strengthened the plants so that they could resist different insects and pests. Chemical fertilizer depletes the soil of all nutrients which means more and more pesticides have to be used. However, the situation now is that not many farmers have enough cows to provide dung for their fields. (University of Cambridge: human waste disposal)

It is in this environment then that the use of human waste as fertilizer is slowly being recognized as a very viable option. Not only will it solve the sanitation problem, but also provide much needed fertilizer - all without wasting India's most valuable and scarce commodity – water.

Following the example of China, India has built hundreds of biogas plants as a means of utilizing the human waste energy excreted by millions of people. The Department of Nonconventional Energy Source (DNES) in collaboration with NGO's and other voluntary organizations started a nationwide plan to popularize its use in many cities and towns. Many companies are now producing and commercializing biogas plants that run solely on human excreta. Although flush toilets that are linked to sewers are found in major cities, in smaller towns and rural areas dry latrines are used. Waste is collected and dumped in collection sites that are connected to biogas plants. Households that had dry latrines were encouraged by DNES to install these latrine linked biogas plants (LLBP) in their homes by giving subsidies to homeowners. (Jayaraman, 1987)

The idea of using human waste to produce energy was not a new concept in India. In the 1950's it was started by a social worker, Appasaheb Patwardhan to ease the misery of the untouchables who had the job of collecting the night soil in buckets, sometimes with their bare hands and transporting these buckets of night soil on their heads. In the state of Maharashtra, several were built, however it failed to become popular due to people's disgust with the concept of energy derived from their excretions. Slowing however, we are seeing a shift in this attitude. There are several factors that contribute to this change. First is the rising cost of cooking fuel and secondly the convenience and ease of using LLBP supplied fuel. In Patna, in the state of Bihar, Sulabh International (previously Sulabh Shauchalay) built 45 public latrines charging the people an equivalent of a few cents to use them. The waste generated was converted to gas and was used for lighting the streets. Considerable progress was made in 1984 and the years following in the construction of LLBP's and the utilization of it's by products.

Street lights in many cities were linked to it. Although it was an ideal way to end defecation, it failed to catch on. Starting in the 1980's when LLBP was first introduced and the advantages that were shown to be derived from it, open defecation by 2012 should have been completely controlled. Unfortunately this did not happen and there were several reasons for it.

Referring to India's sanitation crisis, Santha Sheela Nair, India's Secretary of Drinking Water Supply said: "The day that I can use your toilet and you pay me instead of me paying you, that will be the day when we have really learned to reuse our waste" (Bloomberg, 2009). A two year research project by the Tamil Nadu Agricultural University aimed to do just that. As part of the project, users of the public toilet in Musiri, a remote town in the southern state of Tamil Nadu, got paid up to 14 cents per month to use the toilet. This was a scheme by the authorities to keep the street corners clean and the poor happily lined up. Cards were issued to residents to use the toilets twice a day. Each use was checked off on the card and at the end of the month it was cashed for money. The feces were composted and the urine which has already been filtered by the kidneys was stored and used as fertilizer for various food crops such as bananas. Similar projects all over India are undertaken by public and private enterprises.

Microbial Fuel Cell Technology

Elsewhere microbial fuel cell technology is being used to convert human waste into electricity for rural areas in India. What started as a college experiment in environmental sustainability is now set to provide electricity to the villagers in the most cost effective way possible. It was developed by a chemical engineer named Subrat Kar who developed a method to convert any kind of organic waste into electricity and store it in fuel cells. With this method,

any kind of organic waste, such as kitchen leftovers and even human waste can be used to produce electricity. (MIT Technology Review, 2011)

According to Kar, “I wanted to create something which would be portable, cost effective as well as accessible for villages. All the other fuel cells are quite expensive in the market. The fuel cell which I have designed is apt for the common man as it can be powered by regular household waste without extra charges accrued to the user, while fulfilling the aim of providing light” (MIT Technology Review, 2011). According to Kar eight kilograms of waste can provide electricity for a household for up to 8 hours. As his project guide, Vineet Rathore put it, “Bacteria are used to decompose the matter and they do it so quickly that electricity is produced almost instantaneously” (MIT Technology Review, 2011). Kar plans to further expand this project to generate electricity for heavy appliances like refrigerators and air conditioners.

The Humanure Power Project

A different kind of approach to tackle the sanitation crisis is the “Humanure Power Project/Dell Social Innovation Challenge”. This project will build the sanitation infrastructure thereby generating electricity for the villages. It’s a novel idea in that it meets the two critical needs of rural India namely sanitation and electricity. In the state of Bihar 11 million people do not have access to toilets and similarly not many have electricity. The Humanure Power Project would build a block of community toilets and the human waste collected from it would be linked to a biogas generator. However, since most of the villages do not have power lines, in order to distribute electricity 12 volt batteries would be charged from the electricity generated which would then be rented out to the villagers. Currently kerosene is used for lighting. With

this project the villages would not only have a cheaper but a cleaner alternative. The batteries are to be returned for charging at the charging station and replaced with new ones. Thereby a link is created between using toilets (instead of going to the fields for open defecation) and electricity. Hence the more the villagers use the toilet the more electricity they will generate. With the construction of toilets closer to their dwellings, the villagers do not have to walk long distances to defecate in the open. They now also have a clean, cheaper and a healthier alternative. Moreover, the rental programs generate business opportunities for the local people.

This novel project combines elements from other successful projects thereby seeking to end open defecation. Women and children are to gain the most from this since they are the most vulnerable when they go out to relieve themselves either early in the morning or at dusk when they become targets for molestation and sexual assaults. This novel solution would be preceded by educational programs to educate the villagers regarding sanitation that is hygienic thereby reducing water borne diseases and the use of electricity from batteries as the better source of clean energy.

The concept of composting toilets is slowly taking hold in the US as well and not just for single family homes but for large commercial buildings as well. A good example is the six stories 50,000 square feet office building in Seattle called the Silver Bullitt Center. The waste drops down to the basement where it is collected in one of the 10 composters and then mixed with wood shavings and water, thereby causing it to decompose through bacteria. In about two years' time, the waste turns to fertilizer and is used for plants and other vegetation.

The most unusual and novel use of human waste yet is the construction of durable and solid doors from human waste by Sulabh International. Human waste collected from Sulabh toilets is left to mature for 3 years and then by adding plastic resin to it, solid and durable doors are created from the dried human waste. (Sulabh International Social Service Organization)

The discussion of innovative ideas dealing with human waste would not be complete without the mention of the Bill & Melinda Gates Foundation which has teamed up with Germany to find innovative solutions to sanitation in poor urban and rural areas. Because of the world's limited water resources the projects aim to find innovation means of disposing it. Just recently (2012), the Gates Foundation had the "Reinvent the Toilet Fair" in Seattle which was a 3 million dollar project funded by the Foundation to showcase revolutionary new toilets that function without water, electricity and sewage connection. The projects goal was to help the 2.6 billion people who do not have access to a toilet. As Bill Gates noted on his blog, "we need new ideas to help reduce disease and find new ways to turn crap into valuable stuff, like fuel, fertilizer and fresh water" (Clay, 2012).

In conclusion, if India hopes to contain its sanitation crisis it must look at alternate means of human waste disposal. The conventional sewage system in India (or the lack of it) is not working for it is neither practical nor tenable. The government must focus its resources on alternative and innovative solutions and to this end must invest heavily in research and development. However in 2003, as Sunita Narain, Director of the Centre for Science and Environment put it, "We need massive investments in R and D for non-sewage alternatives. While investments in sewer systems run into billions every year despite all the problems they

create, research investments in non-research alternatives hardly exist” (Narain, 2003: 15). Ten years later, the situation has not improved much.

Chapter 4 - Community Led Total Sanitation (CLTS): Case Study

“Community Led Total Sanitation (CLTS) is an innovative methodology for mobilizing communities to completely eliminate open defecation (OD). Communities are facilitated to conduct their own appraisal and analysis of open defecation (OD) and take their own actions to become open defecation free (ODF)” (<http://www.communityledtotalsanitation.org/page/clts-approach>).

At the core of the CLTS concept is the recognition that improved sanitation can only be achieved through changes in behavior. The previous approach was providing toilets and subsidies to eliminate open defecation. It was thought that providing incentives in the form of subsidies would solve the problem. But this only led to a partial change of habit and a dependence on subsidies. While habits temporarily changed, villages did not totally buy into the concept that the illnesses and diseases was a result of open defecation. Ultimately, subsidies in the form of cash failed to eliminate open defecation in the long term.

Additionally, “CLTS focuses on the behavioral change needed to ensure real and sustainable improvements – investing in community mobilization instead of hardware and shifting the focus from toilet construction for individual households to the creation of “open defecation free” villages. By raising awareness of the fact that as long as even a minority of the community continues to defecate in the open, everyone is at risk of disease, CLTS triggers the community’s desire for change, propels them into action and encourages innovation, mutual support and appropriate local solution, thus leading to greater ownership and sustainability” (<http://www.communityledtotalsanitation.org/page/clts-approach>).

Kamal Kar, a development consultant from India is responsible for pioneering this unique approach. In 2000 he partnered with WaterAid Bangladesh and managed to persuade Bangladeshi villagers to stop the construction of toilets in the village of Mosmoil and change their approach to ending open defecation. He advocated a change in the attitude of the villagers whereby they would analyze their own situation and come to a collective decision to end open defecation.

Bangladesh

In Bangladesh CLTS spread rapidly. NGO's and informal institutions were the key to reform. CLTS emphasizes the community rather than the household. As a result, collective decision making and local problem solving ensures that each household either owns or shares a toilet thus eliminating open defecation. The first step in this process is "to raise awareness of the risk of open defecation and to reinforce a natural sense of "disgust" about this process" (<http://www.communityledtotalsanitation.org/page/clts-approach>).

To make this happen communities take part in discussions and exercises that assess the water and sanitation needs of the community. The community participates in a series of activities that triggers behavior change (as in the case of Mozambique and Ende Island) after which a collective plan of action is developed. Toilets are not provided nor are subsidies given. Instead, the villagers are encouraged to supply the latrine components in an effort to cultivate economic incentive and local entrepreneurship. Local options are emphasized which are based on affordability and durability of the products. Although subsidies are very rarely provided, community wide incentives such as Nirmal Gram Puraskar (Clean Village Prize) as in the case of

the Indian Government award are sometimes given. There is never an individual subsidy but rather a community incentive. Communities can also take out loan for the construction of the toilets. (water.worldbank.org)

Mozambique

CLTS has been a huge success in Mozambique with 2000 toilets built in 2007, 30,000 in 2008 and 270,000 people expected to become open defecation free. With only about thirty nine percent of the estimated 22 million people using some form of sanitation facility, improvement here is slow. However, with the help of CLTS one village at a time is becoming open defecation free.

Since the late 1970's Mozambique has unsuccessfully struggled to end open defecation. As mandated by Samora Machel, Mozambique's independence leader, every family built a latrine. However, the latrines could not withstand the rains and eventually collapsed. According to Manuel Freitas, head of UNICEF's water and sanitation section, "I was working in the provinces at the time and it was my job to see that the latrines were built. And they were. But when the rain came they all collapsed" (George, 2009: http://www.huffingtonpost.com/rose-george/how-to-save-the-world-with_b_334223.html).

As has been the case in India and many other Asian and African countries, just providing latrines has not ended open defecation or even come close to it. These latrines have just been used for purposes other than what they were meant for. For example, toilets provided by the government of India were used to store grains and the building as goats sheds among other

things. Just providing the hardware did not work in India nor did it work in other countries such as Bangladesh and Indonesia.

With the advent of CLTS, things changed dramatically in Mozambique. In 2009 eighty percent of the population was defecating in the open (in the bush land). In the village of Maparanhanga, Americo Muiango, a UNICEF CLTS specialist asked the locals to help him track fresh human feces in the open. This did not embarrass the villagers. However, the triggering moment came when the villagers watched in horror and disgust at the plate of meat and rice that was placed next to some human feces and watched the flies as they sat on the feces and then on the food. Asked to eat the food, (which would have been irresistible in this area of scarcity), an old woman refused because of the flies that were going back and forth between the feces and the food. The villagers who had gathered around were embarrassed and disgusted. It was a moment of revelation since CLTS is not about instruction but revelation.

CLTS aims for total sanitation “.....because that’s the goal: there is little point in 90 percent of villagers having a latrine when the other ten percent are still tramping shit back into the living environment” (George, 2009: http://www.huffingtonpost.com/rose-george/how-to-save-the-world-wit_b_334223.html).

In CLTS this is known as the triggering moment – which is the moment of realization. In the village of Maparanhanga it was the moment when the villagers realized “...that if they defecate in the open, they must be eating their own and their neighbor’s shit.....” (George, 2009: http://www.huffingtonpost.com/rose-george/how-to-save-the-world-wit_b_334223.html) and the CLTS assumption is that human beings cannot stay unmoved once they have realized this.

The CLTS philosophy is about changing the attitudes of people and bringing the change from within as in the village in Mozambique. During this two hour meeting, a lifetime of attitude towards sanitation had changed.

Indonesia

Successful implementation of the “Community Led Total Sanitation” (CLTS) program on the Ende Island of Indonesia led the Indonesian Ministry of Health in cooperation with the provincial and district led government to introduce CLTS in various parts of the country. The success of the program rested on the triggering effects of CLTS to bring about the positive changes in the community. (Indonesian Watsan Working Group, Ministry of Health 2012)

While there were many communities on the main island of Indonesia that became open defecation free from 1990 to 2010, Ende Island became the first among small islands to achieve this success since small islands face many challenges. According to a study carried out by the Ministry of Health, Indonesia, the foremost among these challenges is the lack of fresh water. Additionally, isolation severely limits the circulation of hygiene related information. On April 12, 2011 Ende Island declared itself open defecation free thereby ending its decades old behavior of defecating in the open. This resulted in the prevention of diarrhea outbreaks that affected hundreds of people on the island in 2004, 2005 and twice in 2006. Most importantly, this change in behavior was a result of the adoption of the CLTS program and the cooperation between the district, the national government and the community leaders. Just one faction by itself could never have brought about this change. (Indonesian Watsan Working Group, Ministry of Health 2012)

The CLTS program was absolutely essential in achieving the open defecation free status on the island. Through triggering (which is the most important part of CLTS), the villagers were able to understand the importance of hygiene in preventing repeated occurrences of diarrhea. That at its most basic level defecating in the right place and the washing of hands with soap after defecating is of the utmost importance. (Indonesian Watsan Working Group, Ministry of Health 2012)

Diarrhea Outbreaks

Before 2007 Ende Island was known as the “Island of Catastrophe”, the “Island of Disasters” as well as “the world’s longest lavatory”. Every morning locals would line up along the coast line in the early morning hours to defecate in the open while socializing. This was a daily occurrence that had been going on for generations and which resulted in severe occurrences of diarrhea on the island. In 2005, sixty-seven percent of children ages 5 and younger made up 67% of those suffering from diarrhea. All the efforts by the government to prevent the diarrhea outbreaks failed mainly due to the lack of fresh water on the island. Attempts were made by the government to transport fresh water from another island. However, due to prohibitive costs and other factors the efforts were not successful. The attempts by a Portuguese NGO to install a desalination plant failed due to the fact that the desalinated water was found to be contaminated by E. coli which is found in human feces. (Indonesian Watsan Working Group, Ministry of Health, 2012)

Determined that the access to fresh water was the most important factor in preventing future occurrences of diarrhea as well as ending open defecation, the Water and Environmental

Sanitation program was initiated with the help of UNICEF and other government bodies to make fresh water available to the local population.

In order to bring about this change it was essential that the villagers had access to clean drinking water. For this the government and UNICEF helped provide training to construct rainwater tanks by providing tank molds that the villagers used to either build their own household rain water tanks or communal rainwater tanks which served several households. Once the freshwater problem was taken care of, emphasis was put on “triggering” to initiate the necessary behavioral changes to bring about this change. Community members were trained in this and they in turn provided training to others in the community.

With the help of UNICEF latrine production centers were set up in one of the villages on the island. Several community members were trained in the manufacturing of basic toilets. This not only provided them with income but at the same time made the villagers self-reliant. The success of this program was in large part due to the sense of ownership and accomplishment that the community members felt. They were proud of their hard work. Their strong sense of ownership was evident in their continued use of and diligent care of both the rainwater tanks and the toilets. UNICEF’s collaboration in the execution and development of the CLTS philosophy made the islands open defecation free.

Each village on Ende Island had its challenges. In the village of Rorurangga the village head and the village Civil Defense Chief went door to door to discuss with the families a change in defecation behavior. Village forums, events and discussions centered on a change in behavior resulting in better hygiene. It was because of these interactions that success was possible and in spite of initial resistance from the people, in the end every household in the

village had a latrine in the house. As Juleha Roja put it, “Changing the behavior of a community requires sacrifice, patience, and wisdom. We must first understand each family’s circumstances before we can raise the topic of toilets and defecation” (Indonesian Watsan Working Group, Ministry of Health, 2012: 10)

In the village of Redodori, emphasis was placed on communication. The CLTS approach was the turning point in this effort. Communication was the key. The facilitators gave endless motivation and encouragement to the elders. Parents and teachers all concentrated their efforts on bringing about behavior change in children. Now the beach with its stunning view of the ocean has become a place of relaxation and recreation for all instead of being littered with feces. As the village head noted, “The program’s triggering approach became our turning point. Prior attempts failed because the community was not triggered to change their behavior. What happened before was a lot of empty words”. (Indonesian Watsan Working Group, Ministry of Health, 2012: 12)

The village of Ndoriway was unique in the sense that it had 27 fresh water wells and provided fresh water to other villages on the island. However diarrhea occurrences were common here as well. Change happened when the elders in the community began to monitor the behavior of the villagers. The religious leaders, (the imam of the mosque) became an integral part of the effort. He took it upon himself to patrol the beach at night with his flashlight. Upon finding someone defecating on beach, he would shine his light on them forcing them to run away in shame. Even though now every household has a latrine, it was this sustained effort and persistence that brought about a change in behavior and eliminated open defecation.

The village of Rendoraterua had seen repeated diarrhea occurrences with children under 5 being the hardest hit. Although a public latrine had been built, people were still found defecating on the beach. What changed was the effort by UNICEF to trigger the community through CLTS. Constructing latrines in each household was the homeowner's responsibility. The village contributed 3 bags of cement and one toilet bowl. Furthermore, 45 percent of the village funds were allocated towards the construction of latrines and 5 percent went towards the upgrade of existing ones with the end result that every household here now has its own latrine. In addition sanctions were put in place. Anyone found defecating in the open would receive a warning and made to carry their feces to the nearest latrine.

The village of Paderape saw success by combining their efforts because the community was tightly knit and teenage girls actively participated in this effort after receiving training.

Tailoring the efforts to the needs of the community was the main reason for the success of the program in the village of Puutara. The village designated its own community plan with guidance from the program team. Through dialogues, arguments and differences were resolved. The community as a whole came together to discuss possible solutions and in this process each household voiced its opinion. "Furthermore, involving the entire community in the decision making process and making everyone equally responsible helped strengthen relationships in the community." (Ende Island Handbook)

Ende Island Open Defecation Free Status – Reasons for Success

One of the primary reasons cited for Ende Island's success was the attention given to the island by the district. The district health department decided to focus on the annual

occurrences of diarrhea on the island. They realized that to this end prevention was critical. It was determined that the scarcity of drinking water must be addressed before the problem of defecation could be tackled. To this end they first resolved the fresh water problem and then focused on defecation. The CLTS strategies adopted here were unique to the needs of the island and as such the program cannot be exactly replicated elsewhere since every situation is different. As the head of the health department noted, “The strengths of the program is in the process. This is not solely about building rainwater tanks or latrines: it is about building the community’s sense of ownership and responsibilities over these facilities”. (Indonesian Watsan Working Group, Ministry of Health, 2012: 17)

In order for the CLTS program/strategy to achieve success, the role of the health department staff is of extreme importance. In the case of Ende Island, the staff member who was sent to the island took it upon himself to find out about the local custom and the religion of the community. At first he was met with resistance. Having determined that the people in the community were particularly religious, he created the slogan “Purify your land, purify your people”. Referring to quotes from the Quran which is the holy book of Muslims, (he himself is a Catholic) and the hadith (saying of Prophet Muhammad), he gained respect from the religious leaders, who were willing to listen to him. He gained acceptance from the leaders and from then on was invited to talk to the Friday prayer congregations. His dedication is what made the difference. As he noted, “The people of Ende Island are highly devoted to practicing their religion of Islam, we challenged them to become Indonesia’s third “Gateway to Mecca”. To be able to achieve this, the communities had to leave their old habits of open defecation on the beach which is in violation of their religious teachings.” For his dedication, he received the

honorary title of “Haji”, (one who has performed the holy pilgrimage) by the people of Ende Island

The role of the village head was critical in making Ende Island open defecation free. All the seven heads of the seven villages on the island were highly motivated to bring about change. They did this by involving key people in the community namely religious leaders, village officials, women’s rights individuals and teachers and together they were able to convince the community to bring about change in their behavior.

A unique feature of this community in transition was the creation of “Open Defecation Patrols” which was a group that was “authorized by the village heads to perform surveillance and conduct citizen arrests on community members that continue to defecate in the open.” (Ende Island Handbook). They were expected to be on duty at all times and particularly at dawn and at sunset because at these times violations were at its highest. Those caught had to pick up their feces and carry it to the nearest latrine and were denied financial aid and rice. The patrols were also involved in “Clean Friday’ activities at the mosque as well as other health related youth activities.

As mentioned earlier, religion played a very important part in the behavior modification of the people. Religious leaders were very instrumental in conveying this information. They were trained in the program titled “Hygiene Promotion through Muslim Teachings” whereby the information was imparted through verses of the Quran and the hadith such as, “Keep clean by any means available to you. Truly Allah built Islam on the principles of cleanliness. And none shall enter heaven who does not maintain cleanliness” (The hadith of Al-Thabrani).

The women of the island had a critical role to play and were perhaps the most important agents in bringing about behavior change in families. They were able to constantly remind their children and husbands to practice proper hygiene – namely using the toilet, washing their hands with soap before eating as well as boiling all drinking water.

The children were very open and receptive to the change and women were credited for this.

Hence when they would see someone on the beach without a fishing rod they would yell, “Someone is about to return to old ways” which would embarrass the person into walking away. (Indonesian Watsan Working Group, Ministry of Health, 2012: 23)

Furthermore, the media was used very effectively to this end. Sign posts were erected in significant places reminding people of hygienic behavior. Every village was given the freedom to design its own signs and illustrations. The messages were created in both the Ende languages as well as in Arabic with the message, “Cleanliness is part of faith”.

Finally on April 12, 2011, the people of Ende Island declared themselves open defecation free in a ceremony attended by district officials, the various agencies, the national government, the Netherlands Embassy in Indonesia and most importantly UNICEF. Amid dances and celebrations, representatives from 5 different factions of society namely, women, children, local figures and religious leaders declared their resolve to sustain their achievement. There was a great deal of pride in their achievement and it was evident in their celebrations and in their determination to never revert back to old ways. As the first island in Indonesia to achieve this status, Ende Island through the execution of the CLTS program has become best practice to other regions and countries desiring to become open defecation free.

Chapter 5: Conclusion

With a population of 1.21 billion and growing, India's human waste problem is getting worse by the day. According to data provided by India's census 2011, a shockingly high 49.8 percent of India's 24.66 crore households defecate in the open. Only 46.9 percent of the households have access to a latrine and only 3.2 percent use a public facility.

(www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf)

India's sanitary nightmare is multidimensional. The problem is not just the lack of toilets; it is also the lack of sewage treatment plants, scarcity of water and open defecation. Although in the urban areas 80 percent of the population has access to a toilet, only a third of these household toilets are actually connected to a sewage pipeline. And what is shocking is that many of the sewage lines are not actually connected to a sewage plant with the result that raw sewage is dumped in the open. (<http://dotearth.blogs.nytimes.com/2012/06/14/indias-septic-problem/>)

The health impact of this crisis manifests itself in the many diseases that thrive such as dysentery, typhoid, cholera, hookworm and diarrhea. Human excreta are the cause of over 50 infections that are transferred from a sick to a healthy person through either direct or indirect contact with it. This disproportionately impacts children under the age of 5 and is compounded by the fact that India has the highest rate of childhood malnutrition in the world where almost 44 percent of children under 5 are underweight. According to a UNICEF report every second child in India is malnourished and since malnourished children are more susceptible to diarrheal

diseases this results in them becoming even more malnourished.

(http://www.unicef.org/india/overview_3696.htm)

To tackle this problem, many believe that a non-western approach to managing human waste is the only answer. The scarcity of water as well as the traditional toilet that consumes so much water is neither practical nor tenable in a country like India facing two major challenges: an exploding population and scarcity of water. In many urban and rural areas water scarcity is becoming worse by the day. In numerous urban areas residents get water only for a few hours a day and in rural areas sometimes residents have to walk great distances to get water. This calls for a different approach to human waste management.

Non-western and innovative approaches such as ecological sanitation system (ECOSAN) are viewed as viable alternative in India and other developing countries. Such an approach is also good for the environment as it turns human waste into compost to be used as fertilizer for the soil. This approach is supported by the United Nations Development Program (UNDP) because it not only provides sanitation without wasting water but at the same time ECOSAN increases soil fertility and reduces poverty by creating a flow of income through the sale of compost. Various composting toilets are now on the market and simpler less expensive alternatives would be ideal for India. The perception among environmentalists and some government officials is that the western style toilet and the existing sewage system are not the solution but a part of the problem in a country like India. (Bloomberg, 2009)

Other very novel approaches to containing and managing human waste are also being considered. Using human excrement to generate biogas which is then used for cooking fuel

and electricity is increasing in popularity. With the help of NGO's many towns and villages now have biogas plants that put human waste to very good use. Researchers have come up with many innovative ideas and solutions that have been discussed in Chapter 3.

Furthermore, India's sanitation crisis cannot be improved without first controlling open defecation. No matter how many toilets are built, with over 600 million Indians defecating in the open, there can be no solution to this problem without a significant change in behavior. Many programs that were put in place by the government to end open defecation such as cash subsidies and the Nirmal Gram Puraskar (clean village prize) did not succeed because emphasis was not placed on bringing about behavior change. Instead, the government merely provided the hardware. In order for any program to succeed there has to be complete buy in by the target population. This has been lacking except in cases where Community Based Total Sanitation (CBTS) was the basis of the program. At the core of this concept is the belief that sanitation can only be improved by bringing about a change in behavior. Cash subsidies, as we have seen in India and in other parts of the world have failed to end open defecation for the long term because the residents did not see the connection between open defecation and the risk of disease and illnesses.

In the cases of Ende Island in Indonesia as well as Mozambique in Africa, a permanent change in behavior took place only through "triggering" a connection between open defecation and disease. It brought about the awareness that as long as even a minority defecates in the open everyone is at risk of getting sick. This motivated the community into action and propelled them to bring about change. Citizens took ownership of the problem and their

individual behavior which translated into long term change. Religion played a key role and the entire community became involved and came together to end open defecation thereby bringing dignity and health to the community. In the case of Mozambique the triggering moment or the moment of realization came when the villagers realized that by defecating in the open they must be eating their own and other people's feces. According to the CLTS handbook no human being can remain unmoved once this realization occurs. (2012)

Similarly in the case of the Ende Island shame was used as the main tool to bring about the change. Religion played a key role and the entire community became involved and came together to end open defecation thereby bringing dignity and health to the community.

In order for the World Health Organization (WHO) to meet the Millennium Development Goal (MDG) to improve basic sanitation by 2015 it is critical that India with a 1.21 billion population meet this target. However, in order for India to meet his goal by the end of next year India would have to reduce by half the population of the people who do not have access to basic sanitation. "Given the 1990 level for household without any sanitation facility at 76 percent, India is required to reduce the proportion of household having no access to improved sanitation to 38 percent by 2015" (Central Statistics Organization, 2011: 108)

Due to its increasingly large population and the lack of a cohesive policy, India has not been able to eradicate open defecate and has failed to provide basic sanitation for all its citizens. Because of various reasons, programs like the Total Sanitation Campaign (TSC) for rural areas has failed with the most prominent reason being a lack of buy in by the target

population. In their paper on TSC, “An Untold Story of Policy Failure: the Total Sanitation Campaign in India”, Andres Hueso and Brian Bell explain that:

In reality the TSC was government-led, infrastructure-centred, subsidy-based and supply-led, leading to poor outcomes. The reasons behind the theory practice gap include low political priority; flawed monitoring; distorting accountability and career incentives; technocratic and paternalistic inertia; and corruption.

India has now embarked on a new program, the “Nirmal Bharat Abhiyan” without taking into account the failed lessons of TSC. Based on the concepts of the Total Sanitation Campaign (TSC) that was initiated by the Government of India in 1999, this new program aims to end open defecation by 2020. If India is to achieve success in providing improved sanitation, it must have a cohesive policy that takes into account the failed lessons of the past. A non-western approach that takes into consideration water scarcity must be the priority. Hence India must explore with great urgency a sewage disposal system that is not water intensive because what works in the west is not an option for developing countries like India. Other means of human waste disposal must be explored and India needs to spend resources on research and development. All options must be on the table.

Furthermore, to improve sanitation India must eradicate open defecation as much as possible. As we have seen programs that were put in place like the Total Sanitation Campaign (TSC) have failed because there was a lack of behavior change. Hence, the Community Led Total Sanitation (CLTS) concept that has been so successful in many parts of India must be utilized and must be incorporated into any national policy seeking to end open defecation. Although progress has been slow, I believe India can achieve access to basic sanitation for all as

well as open defecation free status by 2022 if it has a cohesive policy that takes past failures and successes into account.

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